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**10/577909**  
**PATENT COOPERATION TREATY**  
**PCT**

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**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 904422	<b>FOR FURTHER ACTION</b> See Form PCT/PEA/416	
International application No. PCT/JP2005/000163	International filing date (day/month/year) 04.01.2005	Priority date (day/month/year) 19.01.2004
International Patent Classification (IPC) or national classification and IPC INV. B60R16/02 G05B23/02		
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA et al.		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 5 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>		
Date of submission of the demand  27.07.2005	Date of completion of this report  28.03.2006	
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer  Daehnhardt, A  Telephone No. +31 70 340-4268  	

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PCT/JP2005/000163

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-14 as originally filed

**Claims, Numbers**

1-18 filed with the demand

**Drawings, Sheets**

1/3-3/3 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1-18
	No: Claims	
Inventive step (IS)	Yes: Claims	1-18
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-18
	No: Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

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**Box No. VIII Certain observations on the international application**

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

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**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

**1 State of the art**

Reference is made to the following documents:

- D1: US 2003/023407 A1 (LOEHR DIETHARD ET AL) 30 January 2003 (2003-01-30)
- D2: US 2003/009271 A1 (AKIYAMA SUSUMU) 9 January 2003 (2003-01-09)
- D3: US-A-5 957 985 (WONG ET AL) 28 September 1999 (1999-09-28)
- D4: US 2003/151490 A1 (GROSS HELMUT ET AL) 14 August 2003 (2003-08-14)

**2 Claims 1 to 18**

**2.1 Claims 1, 9, 10 and 18; novelty**

The document **D1** is regarded as being the closest prior art to the subject-matter of claims 1, 9, 10 and 18, and shows (the references in parentheses applying to this document, see figures 4, 8) a failure sensing device of a vehicle control system (1) including a control unit (2) generating a control target based on an operation request for controlling a driving state of a vehicle by manipulating a corresponding actuator (5) using the generated control target, and a processing unit (3) connected to said control unit (2) by a network, for generating and providing to said control unit (2) additional information (MF) to be used to modify said operation request or said control target, as necessary, at said control unit (2).

The subject-matter of claim 1 differs from this known device in that said failure sensing device is provided to said control unit with smaller control load, and includes an output portion outputting information to said processing unit with greater control load, a receiving portion receiving a response corresponding to said information from said processing unit, and a sensing portion sensing a failure in said processing unit based on said information and said response.

The subject-matter of claim 9 differs from this known device in that said failure

sensing device is provided to said control unit with smaller control load, and includes an output portion outputting information to said processing unit with greater control load, a receiving portion receiving a response corresponding to said information from said processing unit, and a sensing portion sensing a failure in said processing unit based on said information and said response, wherein units in said vehicle control system are hierarchically configured, and said control unit is arranged hierarchically lower than said processing unit.

The subject-matter of claim 10 differs from this known device in that said failure sensing device is provided to said control unit with smaller control load, and includes outputting means for outputting information to said processing unit with greater control load, receiving means for receiving a response corresponding to said information from said processing unit, and sensing means for sensing a failure in said processing unit based on said information and said response.

The subject-matter of claim 18 differs from this known device in that said failure sensing device is provided to said control unit with smaller control load, and includes outputting means for outputting information to said processing unit with greater control load, receiving means for receiving a response corresponding to said information from said processing unit, and sensing means for sensing a failure in said processing unit based on said information and said response, wherein units in said vehicle control system are hierarchically configured, and said control unit is arranged hierarchically lower than said processing unit.

The subject-matter of claims 1, 9, 10 and 18 is therefore new (Article 33(2) PCT).

## 2.2 Claims 1, 9, 10 and 18; inventive step

The problem to be solved by the present invention may be regarded as accurate failure sensing.

The solution to this problem proposed in claims 1, 9, 10 and 18 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

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Whereas document **D1** discloses a method for monitoring and diagnosis of systems, document **D1** does not disclose that a control unit with greater control load is monitored from a control unit with smaller control load. The features of claims 1, 9, 10 and 18 are not contained in or do not seem to be rendered obvious from the state of the art as mentioned in the search report.

The present claims 1, 9, 10 and 18 therefore also fulfil the provisions of Art 33 (3) PCT.

**2.3 Dependent claims 2 to 8**

Claims 2 to 8 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Dependent claims 11 to 17

Claims 11 to 17 are dependent on claim 10 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

**3 Industrial applicability**

The subject-matter of claims 1 to 18 seems to fulfil the provisions of Art. 33 (4) PCT, since it can be produced and used at least in the automotive industry.

**Re Item VIII**

**1 Clarity**

The terms "**with smaller control load**" and "**with greater control load**" used in claims 1, 9, 10 and 18 are vague and unclear and leave the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of said claims unclear, Article 6 PCT.

## CLAIMS

1. (Amended) A failure sensing device of a vehicle control system including a control unit (100, 110, 120) generating a control target based on an operation request  
5 for controlling a driving state of a vehicle by manipulating a corresponding actuator using the generated control target, and a processing unit (200, 300) connected to said control unit (100, 110, 120) by a network, for generating and providing to said control unit (100, 110, 120) additional information to be used to modify said operation request or said control target, as necessary, at said control unit (100, 110, 120), wherein  
10 said failure sensing device is provided to said control unit (100, 110, 120) with smaller control load, and includes  
an output portion outputting information to said processing unit (200, 300) with greater control load,  
a receiving portion receiving a response corresponding to said information from  
15 said processing unit (200, 300), and  
a sensing portion sensing a failure in said processing unit (200, 300) based on said information and said response.
2. The failure sensing device according to claim 1, wherein  
20 said information is input data for calculation at said processing unit (200, 300), and  
said receiving portion receives as a response a calculation result of said input data substituted into a predetermined calculation formula at said processing unit (200, 300).
- 25 3. The failure sensing device according to claim 1, wherein  
said control unit (100, 110, 120) further includes a diagnosing portion diagnosing a failure in itself.

4. The failure sensing device according to claim 1, wherein  
said control unit (100, 110, 120) is configured by multiplexed calculating units.

5        5. The failure sensing device according to claim 1, wherein  
said control unit (100, 110, 120) further includes a determining portion  
determining interruption of control in which additional information from said processing  
unit (200, 300) is reflected, when a failure of said processing unit (200, 300) is sensed  
by said sensing portion.

10       6. The failure sensing device according to claim 1, wherein  
said control unit (100, 110, 120) is configured by a plurality of control units (100,  
110, 120) controlling an operation of a vehicle, and  
said control unit (100, 110, 120) further includes a sensing portion sensing a  
failure in said processing unit (200, 300) based on a plurality of sensing results from  
15       sensing portions included in said plurality of control units (100, 110, 120).

7. The failure sensing device according to claim 6, wherein  
priorities as to failure sensing are assigned to said plurality of control units (100,  
110, 120).

20

8. The failure sensing device according to claim 7, wherein  
control units (100, 110, 120) with smaller control loads are given higher  
priorities.

25

9. (Amended) A failure sensing device of a vehicle control system including a  
control unit (100, 110, 120) generating a control target based on an operation request  
for controlling a driving state of a vehicle by manipulating a corresponding actuator  
using the generated control target, and a processing unit (200, 300) connected to said



control unit (100, 110, 120) by a network, for generating and providing to said control unit (100, 110, 120) additional information to be used to modify said operation request or said control target, as necessary, at said control unit (100, 110, 120), wherein

said failure sensing device is provided to said control unit (100, 110, 120) with  
5 smaller control load, and includes

an output portion outputting information to said processing unit (200, 300) with greater control load,

a receiving portion receiving a response corresponding to said information from said processing unit (200, 300), and

10 a sensing portion sensing a failure in said processing unit (200, 300) based on said information and said response, wherein

units in said vehicle control system are hierarchically configured, and

said control unit (100, 110, 120) is arranged hierarchically lower than said processing unit (200, 300).

15

10. (Amended) A failure sensing device of a vehicle control system including a control unit (100, 110, 120) generating a control target based on an operation request for controlling a driving state of a vehicle by manipulating a corresponding actuator using the generated control target, and a processing unit (200, 300) connected to said control unit (100, 110, 120) by a network, for generating and providing to said control unit (100, 110, 120) additional information to be used to modify said operation request or said control target, as necessary, at said control unit (100, 110, 120), wherein

said failure sensing device is provided to said control unit (100, 110, 120) with smaller control load, and includes

25 outputting means for outputting information to said processing unit (200, 300) with greater control load,

receiving means for receiving a response corresponding to said information from said processing unit (200, 300), and

sensing means for sensing a failure in said processing unit (200, 300) based on said information and said response.

5           11. The failure sensing device according to claim 10, wherein  
said information is input data for calculation at said processing unit (200, 300),  
and

said receiving means includes means for receiving as a response a calculation  
result of said input data substituted into a predetermined calculation formula at said  
processing unit (200, 300).

10

12. The failure sensing device according to claim 10, wherein  
said control unit (100, 110, 120) further includes diagnosing means for  
diagnosing a failure in itself.

15

13. The failure sensing device according to claim 10, wherein  
said control unit (100, 110, 120) is configured by multiplexed calculating units.

20

14. The failure sensing device according to claim 10, wherein  
said control unit (100, 110, 120) further includes means for determining  
interruption of control in which additional information from said processing unit (200,  
300) is reflected, when a failure of said processing unit (200, 300) is sensed by said  
sensing means.

25

15. The failure sensing device according to claim 10, wherein  
said control unit (100, 110, 120) is configured by a plurality of control units (100,  
110, 120) controlling an operation of a vehicle, and

said control unit (100, 110, 120) further includes means for sensing a failure in  
said processing unit (200, 300) based on a plurality of sensing results from sensing

means included in said plurality of control units (100, 110, 120).

16. The failure sensing device according to claim 15, wherein  
priorities as to failure sensing are assigned to said plurality of control units (100,  
5 110, 120).

17. The failure sensing device according to claim 16, wherein  
control units (100, 110, 120) with smaller control loads are given higher  
priorities.

10

18. (Amended) A failure sensing device of a vehicle control system including a  
control unit (100, 110, 120) generating a control target based on an operation request  
for controlling a driving state of a vehicle by manipulating a corresponding actuator  
using the generated control target, and a processing unit (200, 300) connected to said  
15 control unit (100, 110, 120) by a network, for generating and providing to said control  
unit (100, 110, 120) additional information to be used to modify said operation request  
or said control target, as necessary, at said control unit (100, 110, 120), wherein

said failure sensing device is provided to said control unit (100, 110, 120) with  
smaller control load, and includes

20 outputting means for outputting information to said processing unit (200, 300)  
with greater control load,

receiving means for receiving a response corresponding to said information from  
said processing unit (200, 300), and

sensing means for sensing a failure in said processing unit (200, 300) based on  
25 said information and said response, wherein

units in said vehicle control system are hierarchically configured, and  
said control unit (100, 110, 120) is arranged hierarchically lower than said  
processing unit (200, 300).